FUELS

Vegetation found within Orange County include annual grasses, woodland, desert brush, riparian, timber, coastal sage scrub and chaparral. Chaparral is a mosaic of vegetation communities whose establishment is essentially determined by fires and micro-site conditions. "Hard" chaparral, for the present purposes, is identified as vegetation dominated by Chamise, scrub oak or shrub forms of canyon live oak or interior live oak. It occupies an elevation position generally between low elevation coastal sage scrub (a form of "soft" chaparral) and higher coniferous areas.

1. Fuel Dynamic Pathways

Fire history plays an important role in modifying fuel model assignments in recently burned areas. FRAP developed a method to reflect changes in surface fuel characteristics resulting from past fires, and to account for fuel changes as burned areas regrow. GIS analysis assigned new surface fuel models based on the time since last burned. This process is called the "Fuel Dynamics Pathways".

Fuel dynamic pathways can be simple (e.g., change anything burned in the last 15 years to model 14) or they can be more complex. Below is an example of more complex "fuel dynamic pathways" for areas within Orange County. This table shows that brush fuel models 4, 5, and 6 regrow differently on north and south slopes. (Note that north and south slopes do not differentiate other fuel models.) After a fire on south slopes, for example, fuel models 4, 5, and 6 stay in a model 1 for the first 3 years. After 3 years of regrowth, brush begins to return, reducing wind speeds and adding to fuel loading, producing a typical fuel model 2. Because north slopes are typically wetter, they often have less severe fire and provide for faster regrowth conditions than south slopes. In the example below, brush models on north slopes return immediately (0 -10 years) to model 5, bypassing the grass model phase experienced on south slopes.

Fuel model pathways after wildfire for Orange County.
Models 4, 5, and 6 (brush types):
South slope:
0-3 years since burn model 1
3-16 years since burn model 2
17-25 years since burn model 5
26-40 years since burn model 6
40+ years since burn model 4
North slope:
0-10 years since burn model 5
11-35 years since burn model 6
35+ years since burn model 4
Model 1 (grass):
no change due to fire

Model 2 (pine grass):
0-10 years since burn model 1

10+ years since burn model 2

Models 8,9,10,11,12,13 (timber and any slash models):
0-2 years since burn model 1
2-10 years since burn model 14 (if replanted); otherwise model 2
11-15 years since burn model 5 (due to brush component and immature trees)
16+ years since burn original model.

2. Hazardous Fuels

Assets have a high likelihood of being destroyed in chaparral, grass and transition fuel types. The annual grasses support fast moving but lower intensity fires. The coastal sage scrub supports fast moving fires with higher intensities. The chaparral fuels sustain very high intensities and spotting problems.

Again, GIS thematic layers have been developed to determine the hazardous fuels throughout Orange County. The first layer development included vegetation coverage from the most recent and detailed vegetation composition and structure information. Vegetation data was obtained from the CDF FRAP and from a variety of other sources and merged together to provide a complete, albeit heterogeneous, coverage map. Additionally, a variety of crosswalk methodologies from previous statewide projects were incorporated to filter the vegetation coverage and translate the data to a Fire Behavior Prediction System (FBPS) fuel model. Orange County Fire Authority supplemented this by a crosswalk of data from the Cleveland National Forest, Orange County vegetation mapping program and the GAP Analysis program of the U. S. Fish and Wildlife Service in defining the County's fuel model coverage. This method produced a fine-grained portrayal of surface fuel types as the second layer.

Fuel hazard ranking methodology assigns ranks based on expected fire behavior for unique combinations of topography and vegetative fuels under given severe weather conditions (wind speed, humidity, and temperature). Basically, the ranking procedure is best described in a formula:

Fuel Model + Slope = Surface Ranking
Then
Surface Rank + Ladder Index + Crown Index = Hazard Ranking

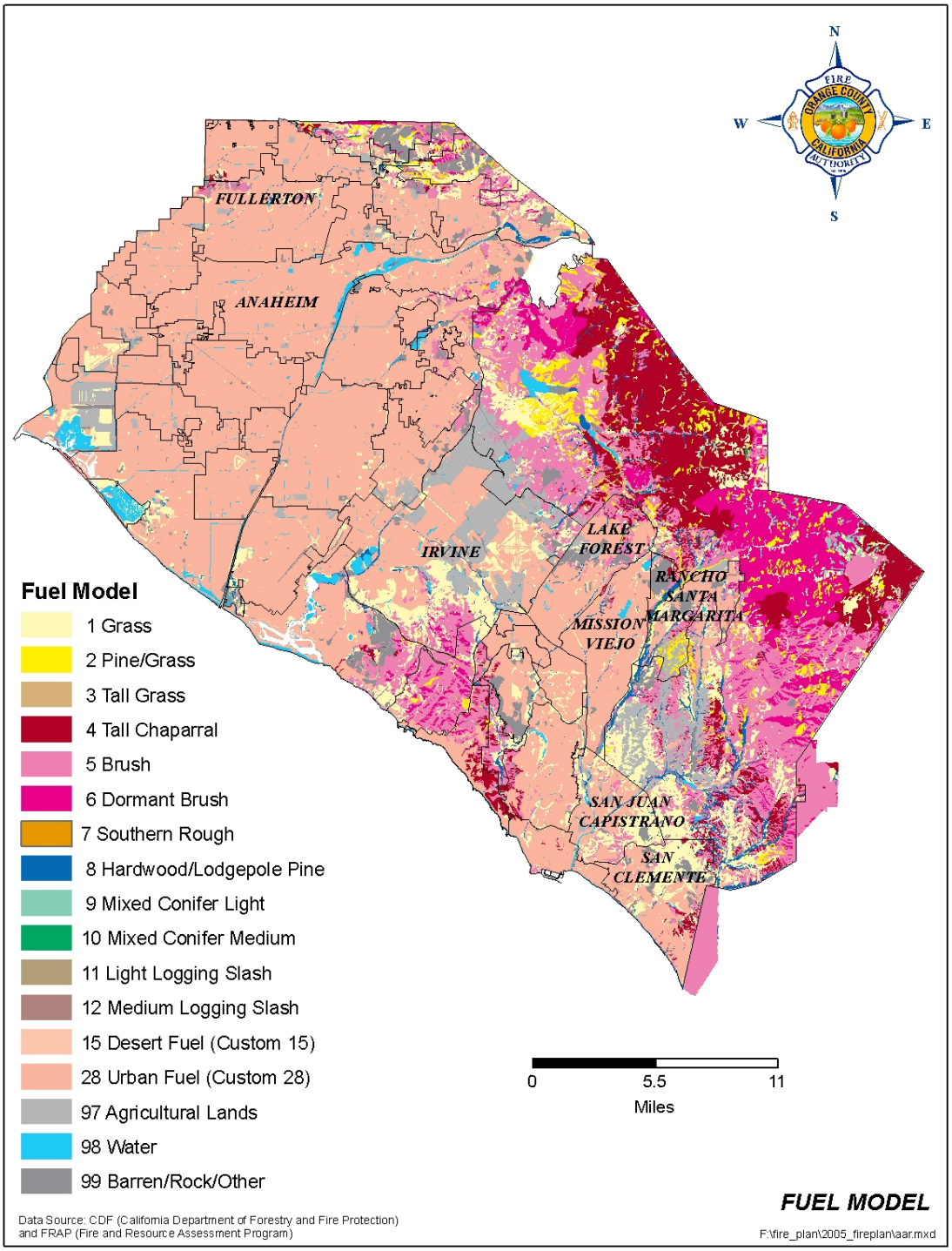
Throughout California the Hazard Rank is broken into three (3) categories: Moderate, High and Very High. Within Orange County the categories are Moderate to represent urbanized areas, High to represent wildland urban interface and Very High representing the wildland areas.

3. Crown and Ladder Fuel Characteristics

The method ascribes additional ladder and crown fuel indices to surface model polygons. If the vegetation data provide sufficient structural detail, the method imputes these additional indices from those data. If the vegetation data lack structural detail, the method imputes indices based on the fuel model.

The ladder and crown fuel indices convey the relative abundance of these fuels. The indices take values ranging from 0 to 2, with 0 indicating “absent", 1 representing “present but spatially limited” and 2 indicating “widespread”. These indices contribute to understanding the probability that torching and crown fire would occur if the stand were subjected to a wildland fire under adverse environmental conditions.

Based on the above methodology a GIS layer produced a fuel hazard ranking by changing the base map to reflect surface fuel characteristics as a result from past fires, and to account for fuel changes as burned areas re-grow. A study will be performed to evaluate post-fire fuel conditions based on comparisons of pre-fire fuel models and the span of time, since the fire occurred. The results will be sent to CDF’s FRAP division to establish future crosswalks. Crosswalk methodology assesses the amount and extent of California's forests and rangelands, analyzes their conditions and identifies alternative management and policy guidelines. This method updates the base map by overlaying fire perimeters on the fuel types, calculating the span of time since the fire for each burned area, and then changes the fuel model within the burned area according to the crosswalk.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ANAHEIM
IRVINE
LAKE FOREST
RANCHO SANTA MARGARITA
MISSION VIEJO
SAN JUAN CAPISTRANO
SAN CLEMENTE
Fuel Model
1 Grass
2 Pine/Grass
3 Tall Grass
4 Tall Chaparral
5 Brush
6 Dormant Brush
7 Southern Rough
8 Hardwood/Lodgepole Pine
9 Mixed Conifer Light
10 Mixed Conifer Medium
11 Light Logging Slash
12 Medium Logging Slash
15 Desert Fuel (Custom 15)
28 Urban Fuel (Custom 28)
97 Agricultural Lands
98 Water
99 Barren/Rock/Other
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Miles
Data Source: CDF (California Department of Forestry and Fire Protection)
and FRAP (Fire and Resource Assessment Program)
FUEL MODEL
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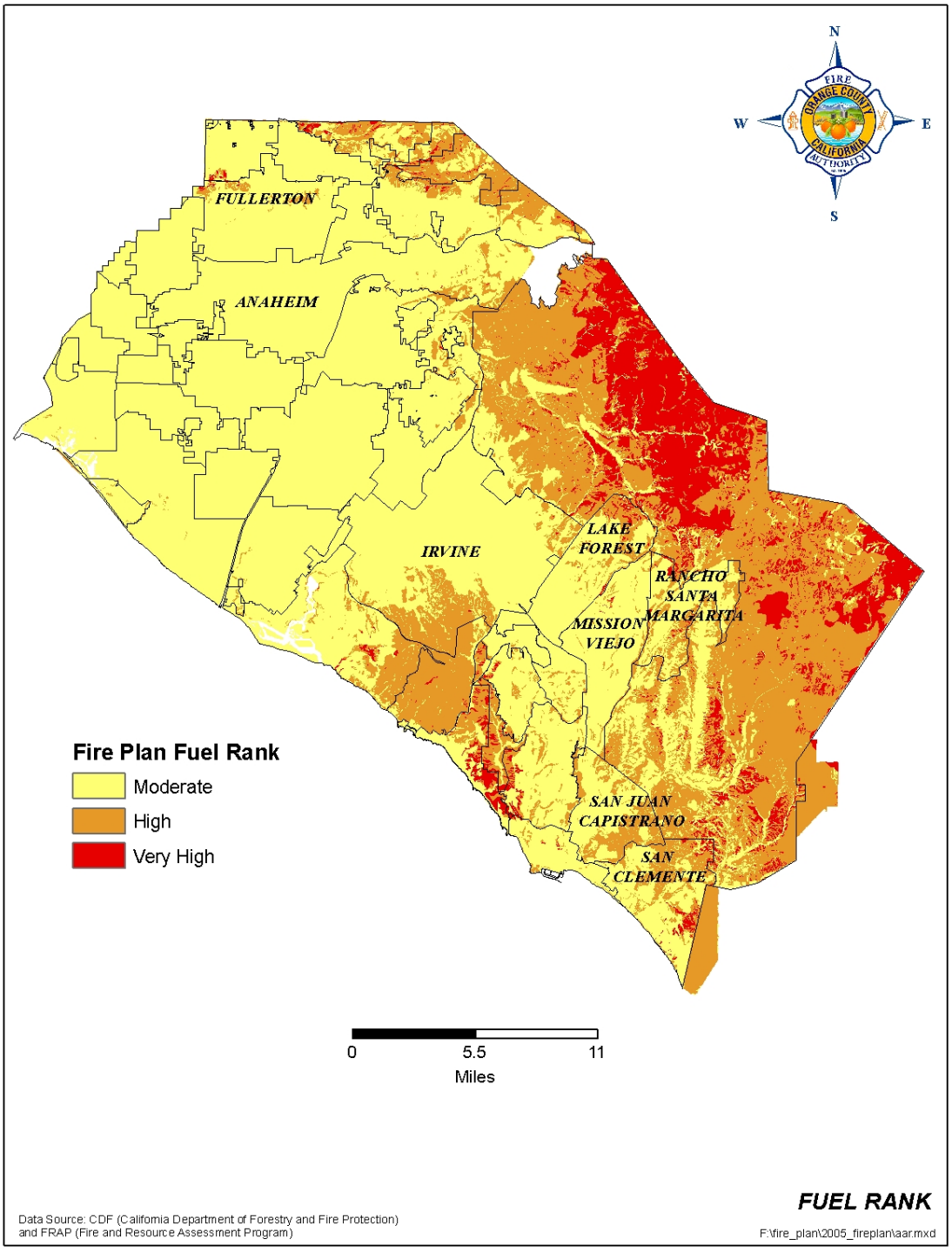
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